OKLAHOMA AGRICULTURAL EXPERIMENT STATION

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CORN GROWING IN OKLAHOMA.

According to the last census report, 1899, Oklahoma farmers planted 1,320,506 acres to Indian corn and they received in return for the labor expended a total yield of 38,239,880 bushels, or an average of 28.9 bushels per acre. The Year Book of the United States Department of Agriculture gives more recent figures in regard to the acreage of corn in this state. In 1906 the total area planted in the new state was 4,036,585 acres, and the total yield obtained was 134,230,590 bushels, or an average of 33.2 bushels per acre. Although there has been a marked increase in the area devoted to corn, the average yield per acre remains practically the same. This result is directly in accord with the conditions which are always met in a new country. Land is comparatively cheap and the farmer is tempted to plant a larger area than it will be possible for him to cultivate thoroughly, hence low yields are secured. As land increases in value more attention will be given to each individual field, and more profitable yields can be expected. It must be admitted that the average yield, which is reported for the above period is decidedly low and that there is ample room for considerable improvement. Some attention and study should be given to the cultural methods, which are followed by our most successful farmers, and at the same time the question of seed selection should be recognized as an important factor in the work of improvement. These methods are certainly within the reach of the practical farmer, and when the possibilities of this field are properly appreciated the average return will exceed thirty-three bushels per acre.

Improvement can be carried a step farther in the realm of plant breeding. Very little thought has been given to this subject until within recent years. The animal breeder, long e'er this, had discovered that he could bring about remarkable changes in form and function by following certain well defined laws, but the plant breeder was slow to perceive that the same principles could be applied with profit in his sphere, and yet in a few years tremendous strides have heen made in bringing to the front some very desirable characteristics in our staple

crops. We have witnessed a wonderful development in the corn plant during this period. It has been demonstrated that by following a systematic plan of breeding the percentage of nitrogen in the kernel can be increased. Likewise there is a possibility of raising the percentage of starch in a given variety, or on the other hand the percentage of oil may be the factor under consideration. Furthermore, the yields of standard varieties have been moved up the scale from a place that was once proclaimed to be the maximum point, and it is clear, judging from past results, that these improved strains can be so modified by breeding as to bring the husbandman still greater returns. The corn breeder in launching his work in this state, should not only keep the items which have been enumerated in mind but he should also remember that there are other desirable characteristics which can be developed. If the climatic conditions under which the Indian corn plant makes its best growth are studied, it will be seen that this crop finds a normal environment in regions where the July temperature does not exceed 80 degrees Fahrenheit. It frequently occurs that the July temperature in Oklahoma is much in advance of the mean temperature of the great corn belt, and during these hot summers the yield of corn is liable to fall below the average. The remedy is obvious. The breeder has at least two avenues in which to work; first, an early variety of corn should be developed so that the plant may reach a stage of maturity beyond the danger point so far as the excessive heat of July is concerned; secondly, drouth resistant varieties of corn can be evolved and when this characteristic had become well established, fair returns may be looked for even under rather adverse climatic conditions.

The character of the soil has a marked influence upon the yield of grain which is obtained. Indian corn makes its best growth upon a deep, well drained soil, thus the alluvial river bottom lands are particularly well adapted to the likes of this plant. Some of our upland types of soil in Oklahoma are not especially well adapted to the growth of Indian corn. During favorable seasons good yields can be expected from fields of this description, but past experience leads us to form the opinion that the season cannot always be depended upon, for even though good crops may be secured upon upland fields for two or more years in succession, the third and fourth may prove to be failures. There are crops which can be substituted for Indian corn, and these can be used in obtaining profitable yields annually upon the upland types of soil to which we have referred. The Kafir plant is one of the most important in this list.

The Indian corn plant requires a fertile soil, although, generally speaking, the crop is not considered as an exhaustive one. A systematic plan of cropping and the application of liberal amounts of farmyard

manure will prevent a rapid decline in the fertility of the soil. A good rotation affords an opportunity for making the best possible use of the plant food, which is stored up within the soil; while at the same time the fields are kept free from weeds by means of the regular culture which is given. The application of barnyard manure not only adds new supplies of plant food to the soil, but it also increases the amount of vegetable or organic matter in the same. Adding such material improves the physical condition of the soil and places it in such a position that larger quantities of moisture may be retained, heat will be absorbed more readily, and the soil can be cultivated with greater ease.

Several rotation experiments are under way on the Station farm. One of these requires a period of three years for its completion, and the following crops are grown in their order: first year, corn; second year, oats; third year, wheat and cowpeas. The latter crop is seeded immediately after the wheat has been removed. Four plats are used in this trial two of which receive manure at varying intervals, while the remaining two receive no manure whatever. The former received an application of farmyard manure at the rate of 13.4 tons per acre in February, 1900, and since that time no further applications of manure have been made. Three crops of corn have been obtained from these plats and the yields of maize for the respective seasons are reported in the following table:

	Yield of Grain		Yield of Stover	
Year	Manured	Unmanured	Manured	Unmanured
1900	17.27	18.92	2.81	2.34
1903	37.22	17.48	2.55	1.48
1906	54.06	42.59	1.50	1.39
Average	36.18	26.33	2.28	1.73

NOTE: In computing the yields of grain seventy pounds of ear corn were considered equal to fifty-six pounds of shelled grain.

In this trial the manured ground gave an average return of 9.85 bushels of grain per acre in advance of the untreated plot. There was also an average difference of .55 ton of stover per acre in favor of manuring. It has been intimated that manure was applied during the year 1900 and if the table is consulted, it will be seen that this material exerted considerable influence in 1906. The latter season was favorable for the corn crop even on upland soils, while in 1901 the crop was injured materially by the hot summer weather. As no continuous culture tests with corn are under way in this series, definite statements cannot be made in regard to the beneficial effects which may have resulted from this plan. It would be safe, however, to make the assertion that this rotation influenced the yields to some extent. The corn grower who wishes to attain permanent success in his work will make no mistake

by giving heed to the suggestions which are presented with reference to the adoption of a systematic plan of cropping.

Before taking up the question of tillage, it might be well to refer briefly to the matter of drainage. The corn plant requires a well drained soil; at the same time, it is doubtful whether any harmful results will be met in cases where the bottom water remains three feet below the surface. On many of the bottom lands of Oklahoma low lying areas may be found; and in these places, during seasons of moderate rainfall, the water accumulates on the surface in the natural basin, perchance in large quantities. As a result, very little, if any, corn is obtained from these sections when the rainfall is above normal. Large fields which contain all the way from five to possibly twenty-five per cent of undrained basins could be improved materially with a few tile drains. Putting in a few thousand feet of tile would not entail very heavy cost, and it is certain the extra yields which would be obtained not only from the swampy area but also from the surrounding land would soon repay the grower for his outlay. These sections in an undrained condition generally produce a heavy crop of weeds late in the season, and from the noxious plants, seed is distributed over the entire farm. It will require extra labor in the coming seasons to keep the cultivated and uncultivated crops free from these pests.

The methods that are followed in the preparation of a seedbed for corn should be thorough in every sense of the word from the commencement of the plowing season until the corn is laid by in the summer. A good seedbed is a prime requisite, and in order to reach the proper goal the preparation should begin at an early date. The corn plant uses a large amount of moisture during the growing season and for this reason an abundant supply should be stored up in the soil. Early plowing, that is, plowing the land in late fall or early winter, will facilitate the collection and storage of water, while early surface tillage in the spring will prevent loss by evaporation. When exceptionally dry weather occurs during the fall and winter, the field should be given a stroke with the harrow, or it might be preferable to pack the loose soil with a roller, or sub-surface packer, and then give the surface light cultivation. The loose mulch, which is formed by this treatment, will prevent the plowed ground from drying out wholly. Some soils are so constituted that when plowed early in the fall, the particles have a tendency to run together; thus the surface becomes very compact by spring time and plowing a second time is a necessity. It would be well to allow such soils to remain untouched until later in the season and then turn the surface to the proper depth. This treatment should also be modified somewhat for types which are affected readily by the wind.

The depth of plowing will depend upon the character of the soil, previous treatment which the field has received, and the time of ...ing. Other minor factors may also have some influence in deter...ing the depth to which the soil is stirred with the plow. Deep, ...ble soils will not require deep plowing, since the mechanical condi...of the particles is not in need of improvement. Soils that have a ... compact sub-surface should be loosened up with the plow, and if ...low plowing has been the practice in such fields the change to a ...ater depth should be gradual. By following this plan, large sup...ss of inert or unavailable plant food will not accumulate at the sur..., hence the young corn will not be checked in its growth throughout ...early part of the season. Deep plowing, although more expensive ...n the other plan of turning the earth to a shallow depth, will be ...nd highly beneficial on some soils, principally for the reason that ...feeding area is much increased thereby. Sub-soiling is a costly ...ration and has not been practiced widely. The work can be done ...e effectively in most instances by using deep rooted plants to open ... subsoil.

Experiments conducted at this Station show that better results can ...obtained by planting comparatively early and this means that the ...rk be done from the 28th of March to the 18th of April. Season con...ions may bring about a slight deviation from this rule. As to the ...st methods of planting, growers differ somewhat in their opinions. ...me favor flat or surface planting with the checked row; others prefer ...plant in drills and cultivate one way; while there are still others who ...vocate planting in the listed row.

Listing corn is a common practice in the new state. Farmers from ...stern states who are not familiar with this plan are frequently in ...ubt concerning the advisability of adopting such a method. The two ...stems have been compared. The Kansas Station has reported six ...periments, and the Oklahoma Station has conducted two trials in ...hich listed maize was compared with corn planted on the surface. ...aking this group as a whole, five out of eight trials of the listed maize ...ve the best results; but in making a study of the average yields for ...e eight tests it was found that the two systems gave about equal re...lts. The surface planting gave a return of 34.4 bushels per acre as ...average for the eight years; while the listed ground gave a yield of ...6 bushels per acre; thus, it will be seen that there is a difference of ...2 bushels per acre in favor of listing. Whatever plan is followed, it ...obvious that the progressive corn grower has no place for a shiftless ...ethod of culture. At best, the soil receives a minimum amount of till...ge and any system which enhances the grower's success should be ...ooked upon with favor. Some farmers make a practice of plowing their

corn fields during the fall of the year or early in the winter and th seed is planted in listed rows at the proper time in the spring. Such treatment enables the grower to place the soil in a first-class physica condition, and if proper attention is given to the selection of good seed and the fertility of the soil is maintained by proper manuring, excellen yields can be expected under average conditions.

The greater part of the planting at the present day is done by ma chinery, hence in order to secure uniform results,—and it is self evident that these depend very much upon an even stand,—it will be necessary to test the planter to determine whether the required number of seeds are being dropped. The vitality or germinative power of the seed should also be ascertained. Representative kernels should be taken from the seed ears and placed between moistened pieces of cloth in the germinating box. The germinating box is then set in a warm room where the temperature stands at 75 degrees Fahrenheit or slightly higher. In the course of six days the sprouted seeds can be counted, and the percentage of viable seeds can be calculated. Individual ears, or samples of seed which give a low test ought to be discarded. Where the viability of the seed is first-class and the planter does uniform dropping, an excellent stand is almost insured. If the planting is done in rows, one kernel every sixteen to eighteen inches will give a stand of sufficient thickness, especially if grain alone is desired. In sections where the precipitation is below normal the plants are given more space. Two or three kernels per hill will give the required stand in cases where the planting is done in rows forty-two or forty-five inches apart. For forage alone the planting can be done somewhat thicker.

The subsequent cultivation should be frequent and thorough. In carrying out this operation, one should bear in mind that the formation of a dust mulch is essential to the conservation of the soil moisture; and in the second place, that weeds are injurious to the successful crop; thus the field should be kept perfectly clean. These objects can best be attained by giving careful attention to the work early in the season. An ordinary smoothing harrow can be used to good advantage in breaking the crust, which forms quite frequently on the surface after planting. This treatment will also destroy many small weeds that make their appearance just as the corn is coming through. As soon as the corn is up nicely, the two horse cultivator can be started in the field. Stirring the surface once in two weeks with this implement would not be over working the soil; in fact, it should be the aim of every corn grower to get over the corn field at least three if not four times with the two horse cultivator. In the summer season additional treatment can be given with a single horse cultivator. Maintaining a dust mulch to a depth of three inches will be found effective on most soils.

Improvement by Selection. In order to bring about permanent improvement both in regard to the yield and the quality of the variety at hand, it will be necessary for the grower to adopt a well defined plan in connection with this work. Haphazard methods produce like results whether in the breeding of live stock, or in the breeding of plants. In the first place, start with a good variety, one which has given more than average results in your locality. As soon as the crop has ripened, first-class seed should be selected from the regular field, and in making such selections attention should be given not only to the individual ears but also to the plants upon which the respective ears were grown. If the work cannot be done at this time, good ears can be saved at the husking time. The selected ears should be stored in a dry place. Unless the grower made a special study of the selected ears last autumn, the spring work must be based entirely upon the characteristics of the individual ears.

Two or three acres of representative or average land can be set aside as a special plat to be planted with the selected seed. It would be preferable to have this small field located some little distance from the regular crop so that the pollen from the plants in the latter field may not come in contact with plants in the former area. If the special plat is to be a part of the regular field it would be well to locate the selected patch on the south or southwest side of the regular field, since the prevailing winds in this section of the country blow from the south and southwest during the summer months. This precaution is taken in order to prevent the pollen from faulty or undesirable stalks from coming in contact with the selected plants. The individuality of the respective ears can be ascertained by planting seed from a single ear in a separate row.

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